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09/813,466	03/20/2001	Bruno C. Silva	MICR0195	3599

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EXAMINER	
GOOD JOHNSON, MOTILEWA	

ART UNIT	PAPER NUMBER
2672	9

DATE MAILED: 05/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/813,466	Applicant(s) SILVA, BRUNO C.	
	Examiner Motilewa A. Good-Johnson	Art Unit 2672	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is responsive to the following communications: Application, filed 03/20/2001; Amendment A, filed 06/30/2003

2. Claims 1-36 are pending in this application. Claims 1, 16 and 24 are independent claims. No claims have yet been amended.

3. The present title of the application is "Morph Map Based Real-Time Rendering" (as originally filed).

Continued Examination Under 37 CFR 1.114

4. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/04/2004 has been entered.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-36 and are rejected under 35 U.S.C. 103(a) as being unpatentable over Laferriere, U.S. Patent Number 6,226,005, "Method and System for Determining and/or Using Illumination Maps in Rendering Images", in view of Blanz, U.S. Patent Number 6,556,196, "Method and Apparatus for the Processing of Images", class 3345/419.

Regarding claim 1, Laferriere discloses a method for simulating a real-time rendering of a desired graphical effect in an image of an object on a display, in regard to a single static viewpoint, (col. 5, lines 1-17, camera point of view) comprising the steps of: precomputing data defining a behavior of light rays illuminating the object (col. 3, lines 5-9, producing illumination map for at least one object in a scene, and col. 4, lines 52-59, determining, i.e. precomputing, each light source, i.e. light rays, in a scene or evaluation of all active components) in regard to the single static viewpoint based on a plurality of input images, (col. 5, lines 8-17, illumination map independent of camera point and view, and therefore a single static viewpoint may be employed) to produce a plurality of morph maps for the object (col. 4, line 66 –6 col. 5, line 7, producing illumination maps) in which at least one set of pixel-dependent data is associated with each pixel position on the display; (col. 7, lines 24-35) b) in response to one of a user action and an event that indicates the desired graphical effect, (col. 5, lines 34-45)

However, it is noted that Laferriere fails to disclose morph maps to perform transformations using the morph maps to produce an output image.

Chen discloses in the morphing process determining a correspondence or mapping of the points in the image and completed the blending in the morph process, col. 4, lines 1-30, and displaying the image, col. 3, lines 35-38.

It would have been obvious to one of ordinary skill in the art at the time of the invention to include the illumination maps created by Laferriere in the morph maps stored for the images as disclosed in Chen to reduce real-time processing requirements to describe the correspondence of the entire morph scene.

Regarding claim 2, Laferriere discloses precomputing comprises the step of producing data that include a blend factor (col. 8, line 40)

Regarding claim 3, Laferriere discloses precomputing comprises the step of producing data that include an additive factor that is used to control saturation of the output image. (col. 8, lines 44-20, diffuse color factor used to adjust the intensity, i.e. saturation)

Regarding claim 4, Laferriere discloses precomputing comprises the step of tracing rays of light to determine the plurality of morph maps based on a global illumination and a local illumination at each intersection of the rays of light with a surface. (col. 13, lines 33-35)

Regarding claim 5, it is noted that Laferriere fails to disclose a) producing a plurality of warped images from the plurality of morph maps; and b) combining the plurality of warped images over a range, with a cross-dissolve, to produce successive output images in which the object morphs between an initial state and a final state.

Chen discloses computing deformed, i.e. warped, images and cross-dissolving the images between a destination image and a source image to produce the final image, col. 5, lines 1-14.

It would have been obvious to one of ordinary skill in art at the time of the invention to include in the illumination maps and the interpolation of the illumination map disclosed in Laferriere, warping image and cross-dissolving to produce the final image, as disclosed in Chen, to provide smoother interpolation.

Regarding claim 6, Laferriere discloses performing the transformation comprises the step of mapping a selected portion of a surface of the object onto a different part of the object to simulate an effect corresponding to movement of the selected portion of the surface over the object. (col. 2, lines 8-64)

Regarding claim 7, Laferriere fails to disclose only pixels of the object that have been altered during the transformation to implement the effect are recomputed in the output image per se, however, Laferriere discloses points of interest are rendered and updated in the appropriate data structure, therefore making it inherent that the data structure would update, i.e. recomputed, the altered points of interest, i.e. transformed image area in the final image, (col. 9, lines 3-30)

Regarding claim 8, a) providing a grid of cells that overlies and bounds pixels in the selected portion of the surface of the object in the output image; (col. 2, lines 10-12) b) for each cell of the grid, associating an arbitrary rectangle having an area that bounds all samples in an original image affected by the pixels in the cell of the output image; (col. 6, lines 13-22) and c) determining a union of all rectangles that are associated with

the cells of the grid that intersect the area of the arbitrary rectangle, to produce the output image (col. 6, lines 30-39)

Regarding claim 9, Laferriere fails to disclose using an index to map between a region in an input image and a corresponding region in the output image, to determine which portion of one of the input image and the output image is changed if a portion of the other of the input image and the output image has changed

Chen discloses an inverse mapping defined for each pixel in the target image to the location of the source image for which correspondences can be mapped, col. 9, line 53 – col. 10, line 22.

It would have been obvious to one of ordinary skill in art at the time of the invention to include in the illumination maps and the interpolation of the illumination map disclosed in Laferriere, indexing of the source and destination image to determine changes in the image, as disclosed in Chen, to prevent holes that may arise in image mappings.

Regarding claim 10, a) mapping a texture onto the object in the output image; (col. 3, lines 5-10) b) applying a reflection to the object in the output image; (col. 2, lines 18-24) c) applying a refraction of the object in the output image (col. 2, lines 18-24)

Regarding claim 11, precomputing includes the step of storing anti-aliasing data for use in producing the output image (col. 14, lines 1-4)

Regarding claim 12, precomputing is based on one of a three-dimensional geometry of the input images and a set of properties of a material in the input images. (col. 7, lines 28-45)

Regarding claim 13, data produced in the step of precomputing includes a lookup table in which parameters used in producing the output image are stored. (col. 11, lines 1-6)

Regarding claims 14-16, they are rejected based upon similar rational as above claim 1.

Regarding claim 17, Laferriere discloses a) anti-aliasing to smooth edges in the output image; (col. 11, lines 1-10) b) displaying light refraction . . . ; c) displaying light reflection . . . ; (col. 2, lines 19-25)

However, it is noted that Laferriere fails to disclose d) morphing between an object in the displayed scene and a substantially altered object . . . ; and e) dynamically warping a selected portion . . .

Chen discloses computing deformed, i.e. warped, images and cross-dissolving the images between a destination image and a source image to produce the final image in the morphing process, col. 5, lines 1-14.

It would have been obvious to one of ordinary skill in art at the time of the invention to include in the illumination maps and the interpolation of the illumination map disclosed in Laferriere, warping image and cross-dissolving to produce the final image, as disclosed in Chen, to provide smoother interpolation and prevent holes that map arise in mapping.

Regarding claim 18, a) an index that identifies a pixel data set from among a plurality . . . ; (col. 7, lines 33-35, a pointer to a linked list, which Examiner interprets as an index) b) an image identifier . . . that indicates one of: i) the input image . . . ; (col. 7,

lines 24-27) and ii) a constant color . . . ; (col. 7, lines 28-33) c) coordinates of the pixel in the input image; (col. 7, lines 36-40) d) the constant color that is to be applied to the pixel . . . ; (col. 8, lines 61-63) f) an additive factor used to shift the appearance . . . ; (col. 8, lines 63-65) and g) a blending factor . . . (col. 8, lines 40-43)

Regarding claim 19, precomputing comprises the step of computing the plurality of morph maps with a light-simulating algorithm . . . (col. 5, lines 1-7)

Regarding claim 20, rendering of a textured patch on a surface of an object as the patch is dragged over the surface . . . (col. 6, lines 1-21)

Regarding claim 21, rendering of an object simulating a refraction that occurs as light reflected from the object passes through a non-homogeneous medium . . . (col. 2, lines 18-25)

Regarding claim 22, only pixels in the input image that have changed are transformed to produce the output image. (col. 6, lines 13-46)

Regarding claim 23, Laferriere fails to disclose bi-directionally mapping between each of a plurality of pixels in a selected region of the input image and a corresponding pixel in a corresponding region of the output image . . .

Chen discloses three dimensional image synthesis and a morphing technique, (abstract) and further discloses the morphing method using a shadow map for each light source from the viewpoint to each point on the image, col. 9, lines 10-40). Chen discloses maps are computed and stored and bi-directional maps stored for each image, col. 4, lines 50-55.

It would have been obvious to one of ordinary skill in the art at the time of the invention to include in the illumination maps disclosed in Laferriere, bi-directional maps, as disclosed in Chen, to further reduce real-time processing requirements for each of the images rendered.

Regarding claims 24-36, they are rejected based upon similar rational as above claims 1-15 respectively.

Response to Arguments

7. Applicant's arguments with respect to claims 1-36 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Motilewa A. Good-Johnson whose telephone number is (703) 305-3939. The examiner can normally be reached on Monday - Friday 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mike Razavi can be reached on (703) 305-4713. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9314 for regular communications and (703) 872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-0377.

Motilewa A. Good-Johnson
Examiner
Art Unit 2672

mgj
May 14, 2004